The status of the Sumatran rhinoceros (*Dicerorhinus sumatrensis*) and other large mammal species in Tamanthi Wildlife Sanctuary, Upper Chindwin District, northern Myanmar

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Introduction

Tamanthi Wildlife Sanctuary, established in 1974, is Myanmar's largest protected area (830.4 mi^2) and constitutes 39% of the total area designated as wildlife sanctuary in the country (Myanmar Forest Department 1990, 1991). Situated in the Sagaing Division ($25^0 26'$ N, $95^0 37'$ E), this area of tropical evergreen forest was protected primarily for large mammals, particularly after being identified by H.G. Hundley as still having a few rhinos "in the triangle between the Uyu and Chindwin Rivers" (Hundley 1952).

All three Asian rhino species were once thought to inhabit Myanmar: Sumatran rhinoceros (*Dicerorhinus sumatrensis*), Javan rhinoceros (*Rhinoceros sondaicus*) and Indian rhinoceros (*Rhinoceros unicornis*). The Indian rhinoceros, if it still exists in Myanmar, is at the limit of its present range possibly inhabiting the areas adjoining Assam and India (Milton 1960, Talbot 1960). The other two species of rhino, once relatively common in Myanmar (Talbot 1960), were already limited to only a few areas by the 1960's (U Tun Yin 1967). Thought to be no more than 26-30 Sumatran rhinos still scattered throughout the country by 1963 (U Tun Yin 1967), the continued poaching of this species pushed it to the verge of extinction in Myanmar by the early 1980's (U Uga 1992).

In 1991 and 1992 reports to the Forest Department of fresh rhino tracks found in Tamanthi and Kahilu Wildlife Sanctuaries and in Putao District of the far north, renewed speculation that there may still be a few populations of Sumatran rhinoceros in Myanmar.

Although the Kahilu Wildlife Sanctuary (62 mi^2) had been set up in 1928 for the protection of a small rhino population, continued poaching in the area has eliminated the Javan rhinos and reduced the Sumatran rhinos down to possibly a single individual (Weatherbe 1939, U Tun Yin 1967, U Uga 1992).

The existence of rhinos in Tamanthi Wildlife Sanctuary was still open to question. Listed internationally as one of three main sites in Myanmar where Sumatran rhinos may still survive (Khan 1989), this sanctuary had never been under any active management and was only infrequently visited by local forest officials. At the time of the survey, no Forest Department official in Yangon knew of anyone that had recently been in the sanctuary.

Although the rhino was considered rare in the Upper Chindwin district since the turn of the century (Brown 1911), rhinos were first reported in Tamanthi by government officials in the 1950's (Hundley 1952). Later, four rhinos were reported in Tamanthi in 1965 (U Tun Yin 1967), and then a total of seven rhinos were said to be seen at two different locations in the area (Hundley 1981). In May 1991, reports of tracks from five rhinos in two different locations were given to the Forest Department (U Uga 1992). Given such reports, a survey of this sanctuary was deemed a high priority by the Myanmar Forestry Department for protection and management of Sumatran rhinos in Myanmar (U Uga 1992).

Objectives

The primary objective of this survey was to investigate the possibility that Tamanthi Wildlife Sanctuary still contained a small population of Sumatran rhinos.

The secondary objectives were as follows:

(1) To estimate possible numbers of Sumatran rhinos remaining in and around the sanctuary.

(2) To assess the status and relative abundance of other key large mammal species such as tiger, elephant, and gaur.

(3) To investigate the condition of the sanctuary in terms of human encroachment and hunting.

(4) To make recommendations for the active management and protection of Tamanthi Wildlife Sanctuary.

Methodology

The difficulty of assessing rhino numbers in forest habitat is well documented. These animals occur at low densities and are patchy in distribution througout vast areas of forest. Their numbers and distribution may be limited by factors such as the availability of mineral sources and the availability of quality broswe material (van Strien 1986). Previous efforts by Borner (1979) and van Strien (1986) in Sumatra suggest that the way to accurately assess rhino densities is through the thorough patrolling of a single, relatively large study area by experienced individuals over numerous months. If time is limiting, a more intensive survey has also proven successful (Rabinowitz 1992).

Information and records from local inhabitants and hunters living in and around rhino areas is also of great use in determining rhino presence (Flynn and Abdullah 1984).

The study of indirect evidence is the most practical procedure for assessing rhino presence (Strickland 1967, van Strien 1986). The best evidence is the presence of tracks which allows the identication of individual rhinos. Other evidence of rhino presence includes wallows or bathing holes, rhino dung, broken and twisted saplings that result from feeding or marking behavior, mud on trees from rubbing of the flanks, and trampling of the undergrowth around frequently used feeding areas. Other field studies (Borner 1979, van Strien 1986) indicate that if rhinos inhabit an area, patrols along ridges and waterways have the greatest chance of finding evidence of the animals. Rhinos often make trails along major ridges. Salt licks or mineral springs, important areas for rhinos, are close to waterways or streams. A complete absence of any large animal trail along ridges with relatively thick undergrowth, can be considered a strong indication that rhinos are not currently resident in the area.

The survey for rhinos in Tamanthi Wildlife Sanctuary was carried out between 23 February and 23 March 1994. Delays and difficulties involved with reaching the site allowed us only eight days in the sanctuary, with the rest of the time spent in travel and interviewing local officials and hunters living on the perimeter of the area (Table 1). The survey started at Yebawmi village, in an area along the eastern boundary of the sanctuary

where there had been reports of recent sightings of rhino tracks. It was here that we met our guide, a reknowned former rhino hunter.

Survey route

Between 7-14 March 1994, we crossed the Tamanthi Wildlife Sanctuary from Yebawmi village on the Uyu River to Swekawngaw village on the Chindwin River. Initially, we travelled overland and along the Nam Malun River, until reaching the Nam Pagan River. We then followed the Nam Pagan River all the way to the Chindwin River (Map 1). In addition to surveying the main waterway, large tributaries (Nam Tanbauk and Nam Kha) and smaller side streams were investigated to look for animal sign. In some areas, surrounding ridgetops were surveyed. This route of travel allowed us to cover key water sources which might be crossed or used by rhinos and other large mammals in the area. It also gave us a more balanced view of both the western lowland area and the hilly eastern side of the sanctuary. Nearly 100 miles were walked in our search for wildlife sign. Our survey team, in addition to ourselves, comprised 21 soldiers from Homalin, 20 porters, five rangers and deputy rangers, three foresters, and our guide.

Results

Wildlife presence

The survey team verified the presence of 21 medium-large size mammal species in the sanctuary (Table 2), and 77 bird species in and around the sanctuary (Table 3). A quick assessment of

waterbird presence and abundance was also made during our travels to and from the sanctuary (Table 4). No sign of Sumatran rhino was found along our survey route. Reliable local reports however, indicate the presence of at least one rhino in the northeast part of the sanctuary. Data on the presence and relative abundance of other mammal species was also compiled.

(1) Sumatran rhino

Although no definitive rhino sign was observed, a total of 33 rhino records spanning the years 1971-1993 were documented for the upper Chindwin River area around Tamanthi Wildlife Sanctuary. Through interviews with local hunters, officials and foresters, these records indicate that a small rhino population existed in the area until the early 1980's (Map 2). However, with at least nine documented rhino kills during the 1980's (Table 5), poaching has reduced any remnant population in the area to near extinction. Our guide, a former rhino hunter, saw rhino footprints himself in 1991. Several sightings of rhino tracks since 1991, indicate the possibility of one or two individuals in the northeast corner of Tamanthi Wildlife Sanctuary. Other recent sightings indicate there may be one or two rhinos alive in the forests between Tamanthi Sanctuary and Indawgyi Lake, and maybe one or two rhinos in the vicinity of Saramati on the Indian border (Map 2).

(2) Big cats - tigers and leopards

Sign of two to three tigers and at least twice that number of leopards was observed during the survey, all in the eastern portion of the sanctuary. Based on these sightings and a model used for

estimating tiger numbers in similar forest types in Thailand (Rabinowitz 1993), we estimate that there may be 15-20 tigers within the Tamanthi Wildlife Sanctuary. However, the presence of poachers using guns and snares, and the reported killing of at least one tiger within the sanctuary in 1992, makes the future of tigers and other large cats very uncertain in the sanctuary.

(3) Elephants

Fresh elephant sign was encountered infrequently even though we often travelled along old elephant trails. Most of the old elephant sign was observed along ridgetops in the eastern half of the sanctuary. A rough estimate of elephant numbers in the sanctuary, based on sign and discussions with local people, is between 50 and 70 individuals.

(4) Gaur

Tracks of gaur were found on several occasions, all in the eastern half of the sanctuary. All the tracks were of individual animals; there was no sign of any sizeable herds of gaur within the sanctuary. It is speculated that there are no more than 100-200 gaur within the sanctuary. The presence of poachers who claim to occasionally catch gaur in their snares indicates that the number of gaur may be declining.

(5) Deer

Tracks of both sambar deer and barking deer were encountered regularly. While evidence of barking deer was found throughout the survey route, sambar deer abundance seemed greatest in the eastern part of the sanctuary.

(6) Primates

Hoolock's gibbons were relatively common throughout the survey route, but other primates - macaques and langurs - were surprisingly scarce.

(7) Bear

Tracks of both Asiatic black bear and the Himalayan sun bear were found several times along the waterways in the eastern portion of the reserve. Sign of both of these species appeared relatively scarce throughout the sanctuary. No estimates could be made.

(8) Other mammals

Tracks of leopard cat and civet species were common throughout the survey route. Tracks of wild dog were seen infrequently and all tracks were of individual animals; no evidence of packs were evident. Evidence of wild pigs were surprisingly scarce. Small-clawed otter presence was localized. The complete absence of otter from some of the waterways seemed to be related to poaching activities.

Human presence in the sanctuary

Although the natural forest habitat of the sanctuary appeared to be intact, there was a high level of human encroachment during the time of the survey. Most of this human intrusion originated from the Chindwin River side. Small dugout boats were used to travel up the Nam Pagan River. In the area of the Nam Tanbauk junction, more than half-way across the sanctuary, more than 30 dugout boats were found. These boats carried an estimated 100+

people into the forest to collect rattan. Numerous rattan trails in this area indicated a high level of use in the area. Although rattan collectors were getting about 10,000 kyats for 1000 pieces of rattan, a large pile of cut rattan was found rotting in the forest. More than 25 dugout canoes carrying 80-100 rattan collectors were also found up the Nam Kha tributary, along with a camp of local people harvesting large quantities of palm leaves (*Livistona*) to sell as thatching.

Hunting was occurring in the sanctuary at various levels. A group of three Lisu hunters from Kachin State walked into our camp at the junction of Nam Pagan and Nam Tanbauk Rivers. They were carrying six small-clawed otter skins, a bag of otter gall bladders and penises, nine steel traps, three large cable snare sets, and one black powder rifle. Several of their snares were still in the forest. We were also told that a second group of Lisu hunters were trapping in the Nam Ezu watershed to the north.

The hunters had bought their steel traps in Mandalay and had used their snares in the past to catch sambar deer, gaur, and occassionally young elephant. They were hoping to catch tiger however, which would be sold for its bones and skin to China. There were reports that the Lisu have been hunting in the sanctuary for at least several years. A tiger was reportedly killed by Lisu hunters along Nam Ezu in 1992. There were also reports of poison carcasses being used to kill tigers, and having resulted in numerous wild pig deaths two to three years prior.

The local people collecting forest products also hunted

wildlife. Rope or vine snares were used for ground-dwelling birds or small mammals, while rifles were sometimes used for primates, larger birds and other wildlife. Although one local member of the people's milita claimed to carry his rifle in the sanctuary "for protection," he carried special heavy shot, along with his normal shot, to kill tigers. During the survey the remains of a rhinoceros hornbill, a langur, a common palm civet, a turtle, and several unidentified birds were left by rattan collectors.

Discussion

We found no evidence that viable populations of Sumatran rhino still exist within Tamanthi Wildlife Sanctuary. Although we only covered a small portion of the sanctuary, we would expect to find some rhino sign if they were present in any numbers in the southern area. Although a few individuals may still survive, it is uncertain if they can replace themselves in the future.

Apart from the Sumatran rhino, Tamanthi Sanctuary is an intact tropical evergreen forest that seems to contain much of the flora and fauna that is representative of such habitat. Unfortunately, many of these species, particularly the large mammals, occur at low densities. Species such as tiger and gaur are already in trouble in the sanctuary and could be completely eliminated if current levels of poaching are not controlled.

In addition to poaching, current levels of human disturbance in the sanctuary are affecting the abundance and distribution of many species. The rattan collecting is not sustainable and

collectors are being forced to move further and further into the forest to obtain the rattan they are after. The disturbance caused by hundreds of people moving through the forest affects the movements and distribution of many large mammal species such as elephant, gaur, tiger and leopard. This was indicated by the lack of large mammal sign in the western portion of the sanctuary where human intrusion was greatest.

While the presence of hunters such as the Lisu are immediately threatening to individual animals, the presence of large numbers of people collecting forest products affects the wildlife indirectly. Animals cannot properly carry out their daily activities nor rear their young in the presence of constant human disturbance. These animals are forced to shift to alternate areas, decreasing the effective size of the area in which they can live.

The Lisu hunters were aware of the illegal nature of their actions, but most local people collecting forest products appeared ignorant that the Tamanthi Sanctuary was protected by law. Some local people were aware that the area was protected, but did not understand what such protection meant. Other people said that they had never seen any government presence within the Tamanthi Wildlife Sanctuary during their lifetime.

Management recommendations

The following is a list of recommendations that could help protect existing wildlife populations in Tamanthi Wildlife Sanctuary:

(1) Wildlife staff should be permanently assigned to the Tamanthi Wildlife Sanctuary and instructed to carry out a detailed program of wildlife management and protection for the area.

(2) A schedule of patrols, particularly along major entry points such as Nam Pagan and Nam Ezu, should be coordinated by the wildlife staff in conjunction with the local military forces.

(3) A sanctuary headquarters should be set up at the village of Tamanthi with a main base in either Khamti or Homalin.

(4) A five-year management or working plan should be drawn up for the sanctuary, with particular emphasis on monitoring the abundance of key species such as tiger and elephant.

(5) Additional surveys should be sent into other parts of the sanctuary, particularly the northeast, to investigate the possible presence of rhino and other wildlife species, and to document the level of human disturbance inside the sanctuary.

(6) Informative signs and posters should be placed along major entry points into the reserve, and in villages along the Chindwin and Uyu Rivers that border the reserve.

(7) All unauthorized human activity, specifically rattan cutting, should be stopped immediately within the sanctuary. Any future human presence in the sanctuary should be stringently controlled and monitored.

(8) Continuous efforts should be made by wildlife staff and the military to learn the time and place of illegal hunting in the sanctuary. Offenders should be apprehended and prosecuted.
(9) Checkpoints should be established at the mouth of major streams to halt boat access into the sanctuary.
(10) A program of wildlife conservation can be taken to local villages and schools to keep villagers informed of protection and management activities in the area, and to educate young people.

Summary

Tamanthi Wildlife Sanctuary is one of the most important sites for wildlife in Myanmar. Interviews with local forestry officials and hunters indicate that many large mammal species, such as tiger and gaur, are already scarce or absent from many reserve forests of the Upper Chindwin area where they were once relatively abundant. At present, the tropical evergreen forest of Tamanthi Wildlife Sanctuary is essentially intact and, with the exception of rhino, appears to contain viable populations of most wildlife species known from that part of Myanmar. However, the level of human activity within the sanctuary clearly indicates that many of the large wildlife species will follow the path of the rhino towards extinction if proper management and protection are not taken immediately. Of particular concern in the area are large, vulnerable species such as the tiger, which naturally occurs at low density and could be wiped out in the sanctuary within a few years.

Rough population estimates for some of the large mammal species in Tamanthi Wildlife Sanctuary are as follows:

Sumatran tiger.....1-2
Indochinese tiger....15-20
Asian elephant.....50-70
Gaur.....100-200

The future survival of Sumatran rhino in the Upper Chindwin area is doubtful. However, the active protection of Tamanathi Wildlife Sanctuary can help ensure that much of Myanmar's other wildlife species will continue to survive well into the future, and improves the chances for any remaining rhinos in the area.

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Table 1. Itinerary of survey trip into Tamanthi Wildlife Sanctuary.

February 21: Arrive Yangon.

February 21-28: Wait in Yangon for permission to proceed to Tamanthi Wildlife Sanctuary.

February 28-March 1: Fly to Mandalay, purchase ticket to Khamti.

March 2: Arrive in Khamti.

March 3: Khamti to Tamanthi village by boat on Chindwin River.

March 4: Tamanthi to Homalin by boat on Chindwin River.

March 5: Homalin to Nandaw in two boats on Uyu River.

March 6: Nandaw to Yalagung on Uyu River.

March 7: Yalagung to Yebawmi. Start hike into Tamanthi Sanctuary.

March 7-14: Survey Tamanthi Sanctuary

March 14: Arrive in Swegawngaw. Swegawngaw to Homalin on Chindwin.

March 15: Homalin to Abundgaung on Chindwin River.

March 16: Abundgaung to Kalewa on Chindwin River.

March 17: Kalewa to Monywa to Manadalay by truck.

March 18: Manadalay. Purchase tickets to Yangon.

March 19: Fly to Yangon.

March 20-22: Meet with Forestry officials about Tamanthi survey. Prepare initial report.

March 22: Fly to Bangkok, Thailand.

Table 2. Mammal species identified in Tamanthi Wildlife Sanctuary, northern Myanmar.

Species	Method of identification
A. LARGE MAMMAL SPECIES	
Sumatran rhinoceros (*Dicerorhinus sumatrensis*)	Local report
Asia elephant (*Elephas maximus*)	Tracks/feces
Indo-chinese tiger (*Panthera tigris*)	Tracks/feces/scrapes
Asiatic leopard (*Panthera pardus*)	Tracks
Clouded leopard (*Neofelis nebulosa*)	Tracks
Gaur (*Bos gaurus*)	Tracks
Domestic water buffalo (*Bubalus bubalis*)	Visual
Malayan sun bear (*Helarctos malayanus*	Tracks
Asiatic black bear(*Selenarctos thibetanus*)	Tracks
Indian wild dog (*Cuon alpinus*)	Tracks
Sambar deer (*Cervus unicolor*)	Tracks
Barking deer (*Muntiacus muntjak*)	Tracks
Wild pigs (*Sus scrofa*)	Tracks/diggings
Hoolock's gibbon (*Hylobates hoolock*)	Visual/vocalization
Rhesus macaque (*Macaca mulatta*)	Visual
Pig-tailed macaque (*Macaca nemestrina*)	Visual
Langur (possibly Phayre's) (*Presbytis* sp.)	Hunter kill
B. SMALL-MEDIUM SIZED MAMMALS	
Small-clawed otter (*Aonyx cinerea*)	Hunter kills
Common palm civet (*Paradoxurus hermaphroditus*)	Hunter kill
Burmese ferret-badger (*Melogale personata*)	Tracks
Leopard cat (*Felis bengalensis*)	Tracks
Malayan giant squirrel (*Ratufa bicolor*)	Visual

Table 3. Bird species observed in and around Tamanthi Wildlife Sanctuary, northern Myanmar. List by U Thein Aung.

Indian Shag	Phalacrocorax fuscicollis
Great Cormorant	Phalacrocorax carbo
Oriental Darter	Anhinga melanogaster
Cattle Egret	Bubulcus ibis
Little Egret	Egretta garzetta
Plumed Egret	Egretta intermedia
Indian Pond-Heron	Ardeola grayii
Little Heron	Butorides striatus
Grey Heron	Ardea cinerea
Wolly-necked Stork	Ciconia episcopus
Black-necked Stork	Ephippiorhynchus asiaticus
Black Kite	Milvus migrans
Brahminy Kite	Haliastur indus
Black-shouldered Kite	Elanus caeruleus
Pied Harrier	Circus melanoleucos
Crested Serpent-Eagle	Spilornis cheela
Bar-headed Goose	Anser indicus
Lesser Treeduck	Dendrocygna javanica
Ruddy Shelduck	Tadorna ferruginea
Common Shelduck	Tadorna tadorna
Common Pintail	Anas acuta
Spot-billed Duck	Anas poecilorhyncha
Common Pochard	Aythya ferina
Eurasian Wigeon	Anas penelope
Grey Peacock-Pheasant	Polyplectron bicalcaratum
Red Junglefowl	Gallus gallus
Imperial pheasant	Lophura imperialis
Green Imperial Pigeon	Ducula aenea
River Lapwing	Vanellus duvaucelii
Red-wattle Lapwing	Vanellus indicus
Grey-headed Lapwing	Vanellus cinereus
Small Pratincole	Glareola lactea
Little Ringed Plover	Charadrius dubius
Common Sandpiper	Actitis hypoleucos
Wood Sandpiper	Tringa glareola
Black-winged Stilt	Himantopus himantopus
Great Thick-knee	Esacus recurvirostris
Indian Skimmer	Rynchops albicollis
Black-bellied Tern	Sterna acuticauda
River Tern	Sterna aurantia
Red-breasted parakeet	Psittacula alexandri
Spotted Dove	Streptopelia chinensis
Chestnut-headed Bee-eater	Merops leschenaulti
Common Kingfisher	Alcedo atthis
White-throated Kingfisher	Halcyon smyrnensis
Stork-billed Kingfisher	Halcyon capensis

Dollarbird	Eurystomus orientalis
Indian Roller	Coracias benghalensis
Common Koel	Eudynamys scolopacea
Indian Cuckoo	Cuculus micropterus
Pied Kingfisher	Ceryle rudis
Hoopoe	Upupa epops
Indian Pied Hornbill	Anthracoceros albirostris
Great Hornbill	Buceros bicornis
Blue-throated Barbet	Megalaima asiatica
Sand Martin	Riparia riparia
White Wagtail	Motacilla alba
Barn Swallow	Hirundo rustica
Red-whiskered Bulbul	Pycnonotus jocosus
Black-crested Bulbul	Pycnonotus melanicterus
Black-hooded Oriole	Oriolus xanthornus
Common Iora	Aegithina tiphia
Golden-fronted Leafbird	Chloropsis aurifrons
Asian Fairy-bluebird	Irena puella
Greater Racket-tailed Drongo	Dicrurus paradiseus
Bronzed Drongo	Dicrurus aeneus
Large-billed Crow	Corvus macrorhynchos
Stonechat	Saxicola torquata
Blue Rock-Thrush	Monticola solitarius
Black-naped Monarch	Hypothymis azurea
White-browed Fantail	Rhipidura aureola
Ashy Wood-swallow	Artamus fuscus
Jungle Myna	Acridotheres fuscus
Collared Myna	Acridotheres albocinctus
Common Myna	Acridotheres tristis
Hill Myna	Gracula religiosa
Oriental White-eye	Zosterops palpebrosus

Table 4. Waterbird survey, Upper Chindwin - Uyu Rivers, northern Myanmar, March 3-7, 1994. List compiled by Dr. George Schaller and U Thein Aung.

I. Route travelled: South down Chindwin River about 110 miles from Khamti to Homalin. Chindwin River up to 300 yards wide with broad sandbars. From Homalin, about 70 miles north up Uyu River to village of Yebawmi. The Uyu was no more than a third as wide as the Chindwin River and was very silty from gold mining practices.

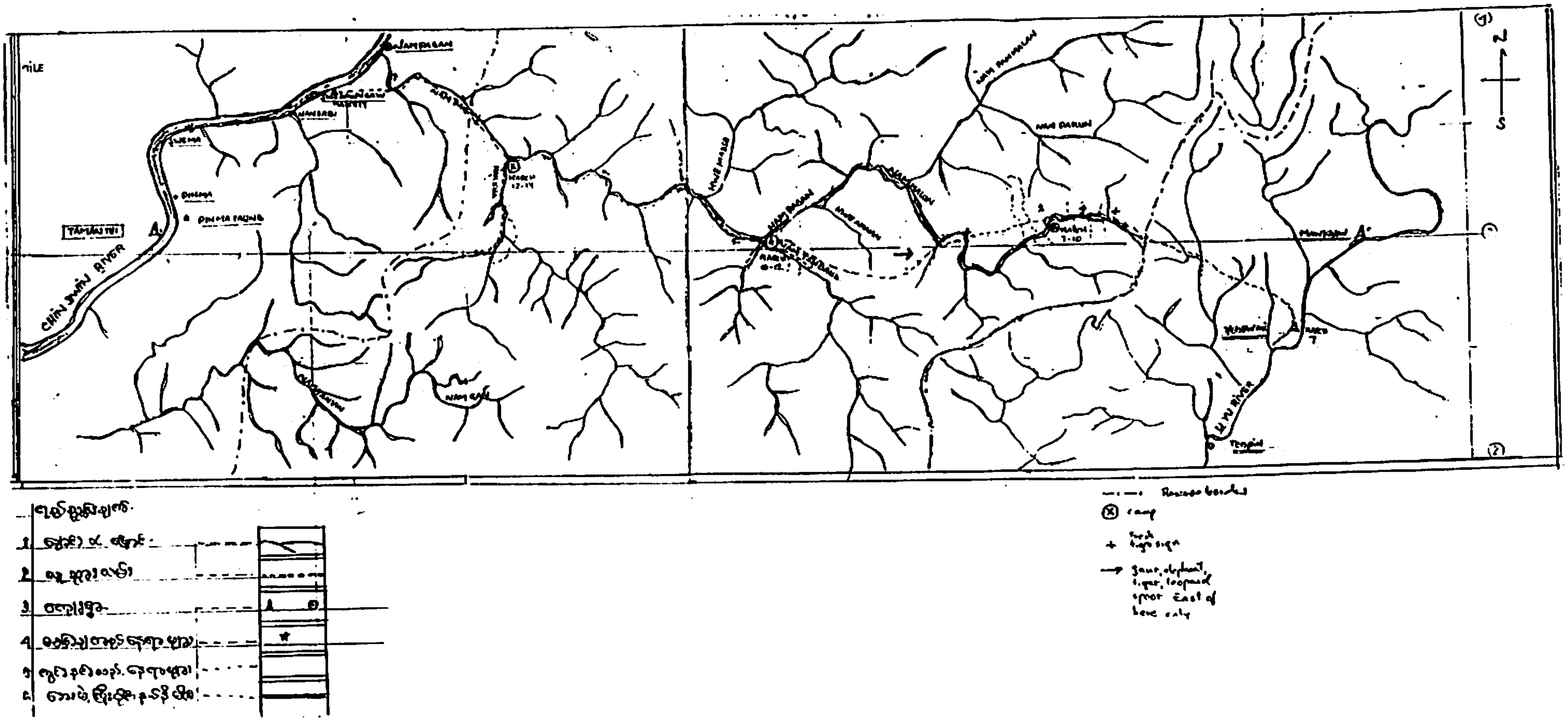
II. Species	Relative abundance
Indian shag (Phalacrocorax fuscicollis)	Sparse along Chindwin
Oriental darter (Anhinga melanogaster)	Sparse along Chindwin
Little egret (Egretta gazetta)	Common but scattered
Plumed egret (Egretta intermedia)	Sparse but throughout
Cattle egret (Bubulcus ibis)	Scattered flocks
Little heron (Butorides striatus)	Seen twice on Uyu
Indian pond heron (Ardeola grayii)	Seen three times on Uyu
Grey heron (Ardea cinerea)	Sparse but throughout
Black necked stork (Xenorhynchus asiaticus)	One pair on Uyu
Ruddy shelduck (Tadorna ferruginea)	Common: pairs/small flocks
Lesser treeduck (Dendrocygna javanica)	Three flocks: 100+ birds
Spotbill duck (Anas poecilorrhyncha)	Pairs/small flocks:@25 birds
Barheaded goose (Anser indicus)	Six seen on Chindwin
Grey-headed lapwing (Vanellus cinereus)	Seen twice
River lapwing (Vanellus duvaucelii)	Sparse and scattered
Little ringed plover (Charadrius dubius)	Seen once on Uyu
Common greenshank (Tringa nebularia)	Seen three times on Uyu
Common redshank (Tringa totanus)	Seen twice on Uyu
Black winged stilt (Himantopus himantopus)	Seen once on Uyu
Great thick-knee (Esacus magnirostris)	Seen once on Chindwin
Small pratincole (Glareola lactea)	Several seen on Chindwin
Black bellied tern (Sterna acuticauda)	Sparse and scattered
River tern (Sterna aurantia)	Sparse and scattered
Skimmer (Rynchops albicollis)	

III. Summary: In general, waterfowl and shorebirds were scarce in numbers and variety. In one area along the Chindwin, 25-30 miles south of Homalin, there were several flocks of ducks up to to 100 and of mixed composition including four species not seen farther up the Chindwin and the Uyu, and not included in the above list:

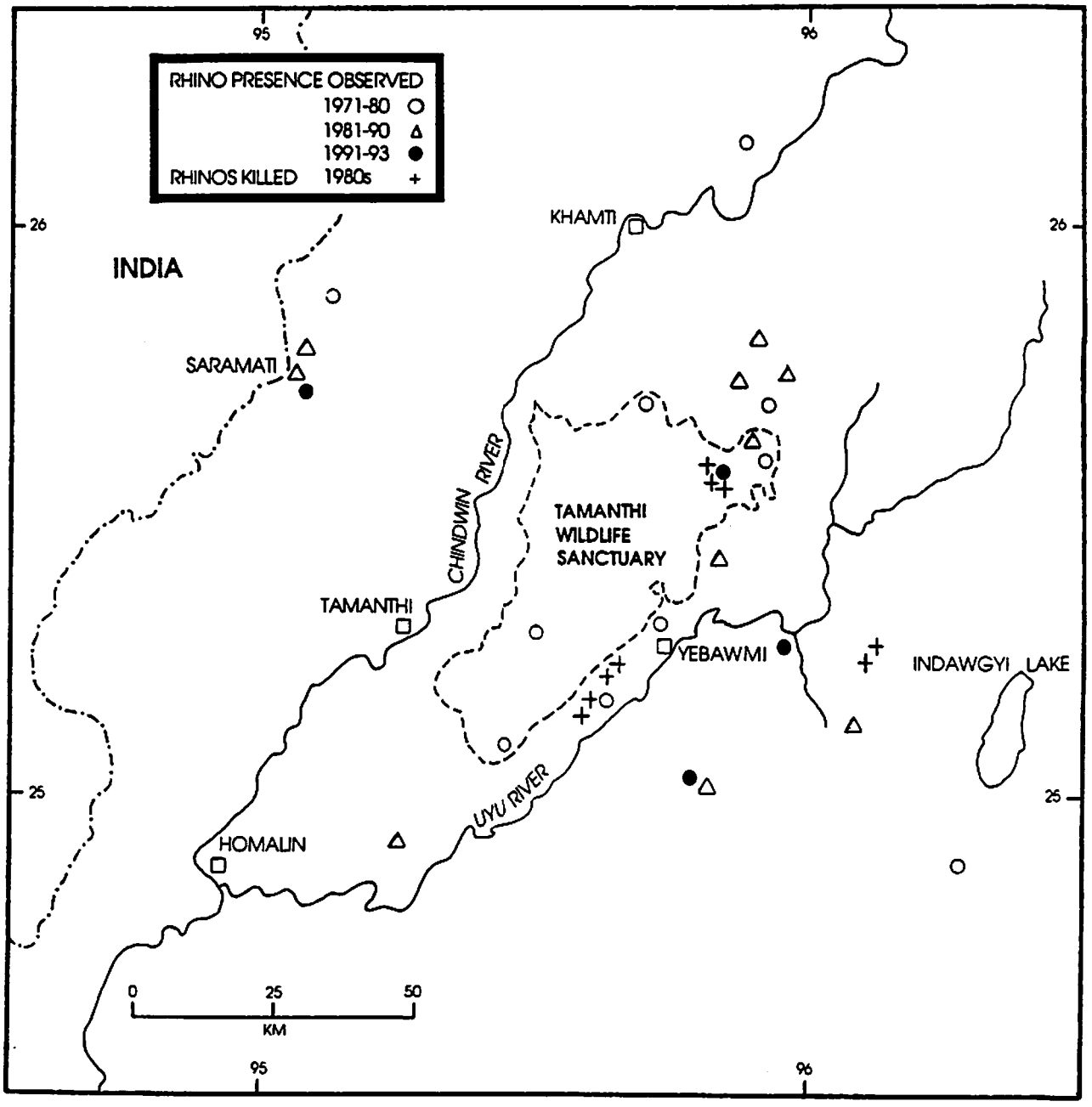
Common shelduck (Tadorna tadorna)
Pintail (Anas acuta)
Common pochard (Aythya ferina)
Eurasean widgeon (Anas penelope)

Table 5. Reports of rhinos killed around Tamanthi Wildlife Sanctuary since 1980.

Hunter's village	Rhino sex	Year	Locality
1) Yebawmi village	Male	1980	Between Uyu River and reserve. Area of Upper Nam Noknin & Nam Pahok Rivers.
2) Yebawmi village	Female	1981	Same general area as 1).
3) Namhta village	Male	1982	Southwest along same mountain range as 1) and 2). Between headwaters of Nam Noknin and Nam Tonkhan Rivers.
4) Namhta village	Male	1982	Same general area as 3).
5) Unknown	Male	1983	East of Sezin (upper Uyu) in Kamaing District, along upper Namaw Hka ($25^{0}17'N$ $95^{0}47'E$).
6) Unknown	Female	1983	Same area as 5).
7) Pahok village	Male	1980	In NE part of reserve in mountainous area of Nam Pilin ($25^{0}36'N$ $95^{0}47'E$).
8) Pahok village	Male	1982	Same area as 7).
9) Pahok village	Female	1982	Same area and within one month of 8).


N
S
CHIN DWIN RIVER
TAMANTHI
camp
fresh tiger sign
game, elephant, tiger, leopard spoor East of here only

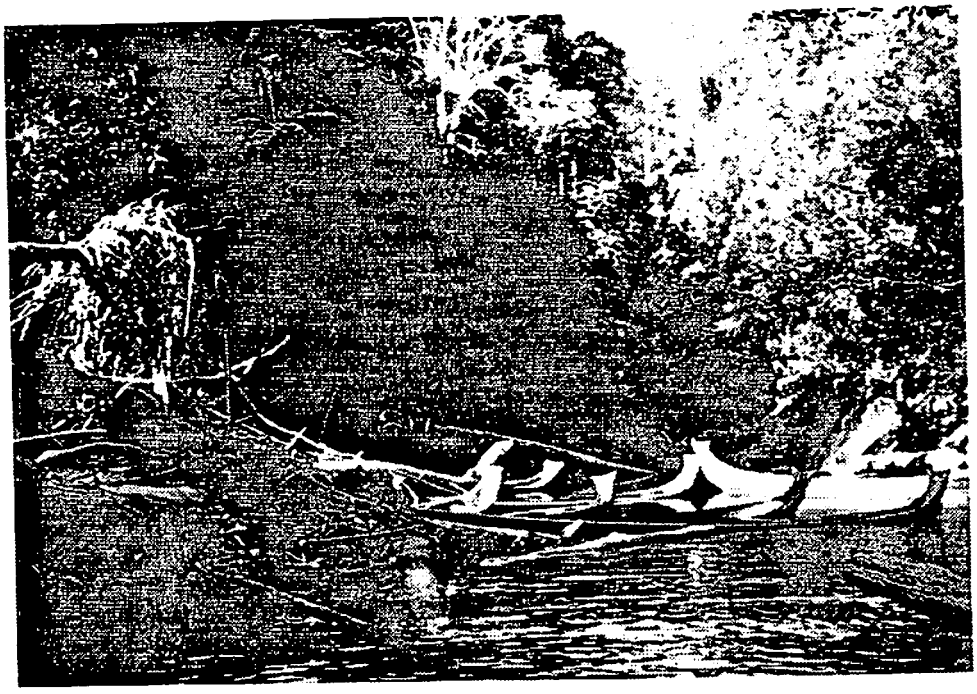
Map 2. Reported rhino locations in and around the Tamanthi Wildlife Sanctuary, 1970-1993, with reports of rhinos killed during 1980's.



Dr. George Schaller hiking along a ridgetop to look for rhino sign.

Dr. Rabinowitz and U Thein Aung looking for animal sign along a tributary of Nam Pagan River.

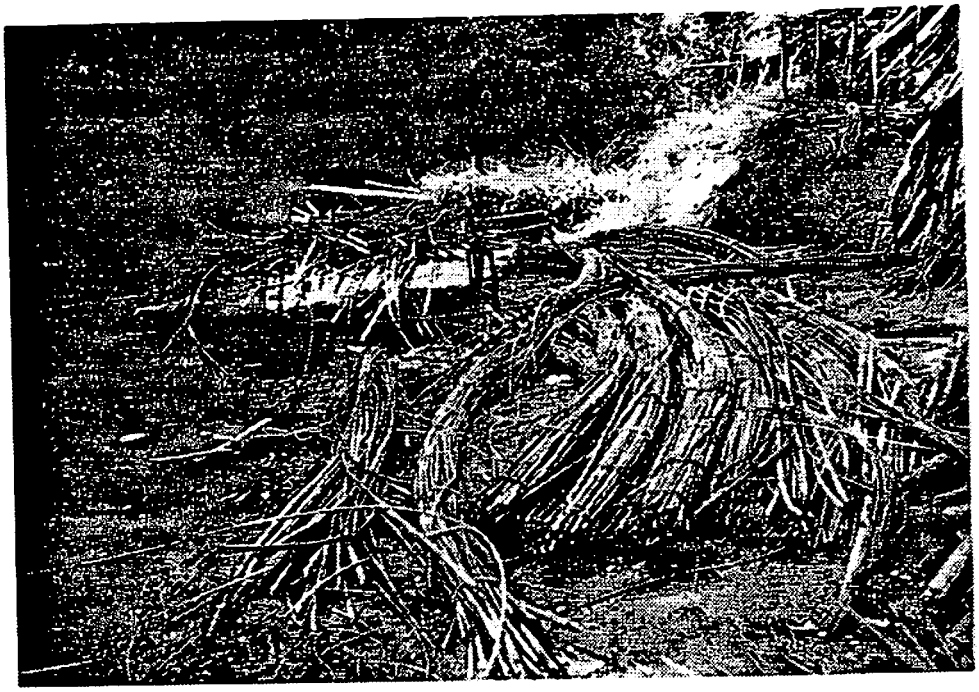
Boats from rattan collectors in Tamanthi Wildlife Sanctuary



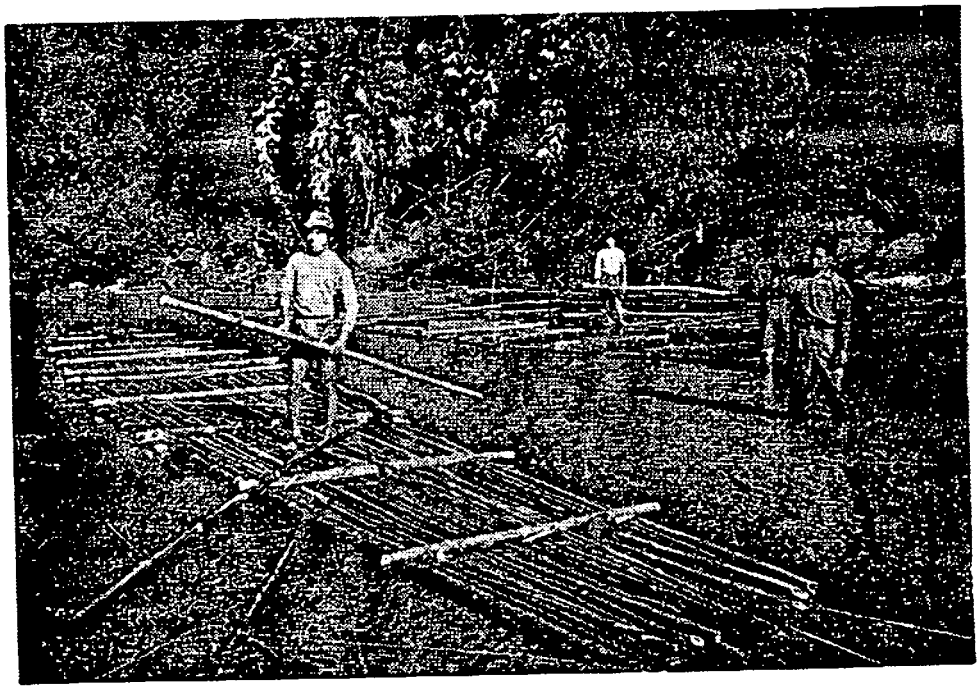
Local rattan collectors coming into Tamanthi Wildlife Sanctuary

Local rattan collector making a snare for catching birds or small mammals

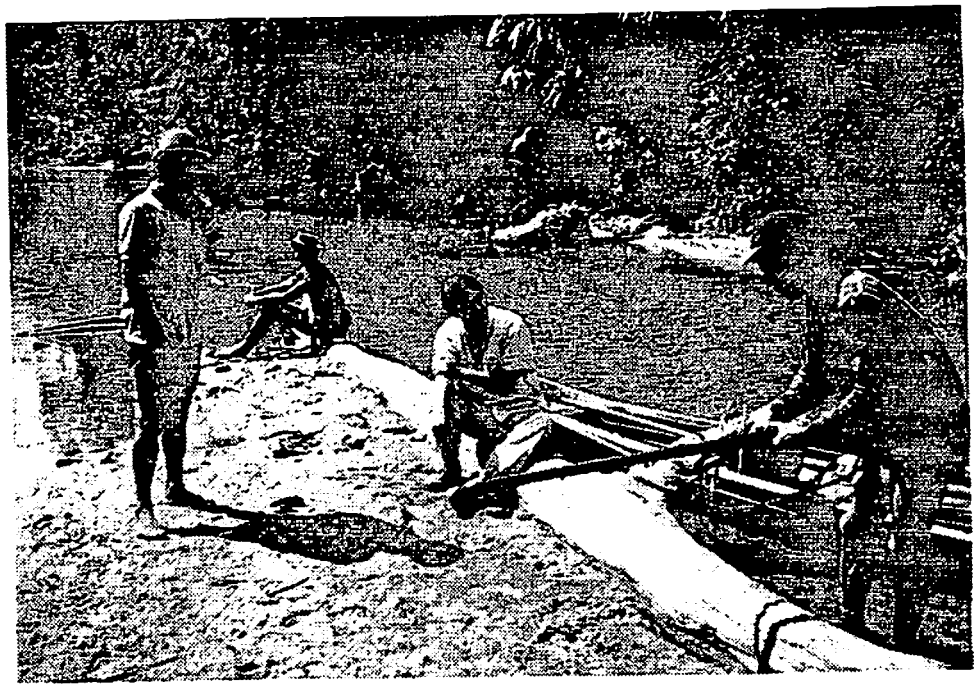
Rattan collected at one campsite inside Tamanthi Wildlife Sanctuary



Bamboo rafts being built inside Tamanthi Sanctuary to carry large quantities of palm leaves out to sell as thatching



U Uga with local rattan collector discussing why he is carrying a rifle in the sanctuary



Two Lisu hunters from Kachin state captured by soldiers with snares, traps, gun, and otter pelts.

Dr. Alan Rabinowitz and U Uga talking with local officials about wildife in the area

Dr. George Schaller and U Thein Aung questioning local hunter about rhinos and other wildlife in the area

Dr. George Schaller with U Thein Aung planning our trip

Dr. Schaller and U Uga talking with village headman about rhinos and other wildlife in the area along the Chindwin River

Dr. Schaller with Lt.Col Zaw Nyut discussing plans for our survey

Forest rangers on our survey team exploring a small tributary for rhino sign